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Executive Summary

The Portuguese research and development (R&D) situation has been changing rapidly, with the country advancing to a GERD/GDP ratio of 1.66% in 2009 and with the business sector becoming since 2007 the most important R&D performer, with the business share in GERD reaching 47% in 2009.

It has been the co-evolution of private and public funding that has allowed a steady progress in R&D expenditure. By 2001 the R&D/GDP ratio was still below the 1% mark, at 0.85%. In that year the proportion of the public sector in the total financing of R&D was 61% while the business sector had a 32% share. Only by 2007 Portugal reached a R&D/GDP ratio above 1%, to progress more recently to 1.66% in 2009.

The effort reported above has been translated into a significant improvement in research output. With regard to scientific publications [data released by GPEAR](#) indicates that the number of ISI publications per million inhabitants for 2010 reached 832, an increase of 123% as against 2004. Though partly due to the low starting basis, the growth is remarkable, leading the indicator for Portugal to correspond to 81% of the EU average in 2010. Patent statistics indicate a significant growth in international patenting. Between 2004 and 2010, the [number of USPTO filings](#) experienced a 3.7-fold increase, reaching a total of 111 in 2010, while between 2004 and 2009 the [EPO filings](#) recorded a two-fold increase, reaching a total of 206 in 2009. In spite of this growth, patents continue to be the weak link of Portugal's research output. This situation reflects the insufficient concern with exploitability.

Governance of the RSI system is still largely dominated by the public sector. The research system has been marked by a high degree of centralisation, through fund allocation and political coordination. The formal structures for hearing the main stakeholders have only occasionally been used. The low participation of the private sector in the governance of the RSI system is a result of policy options, but also of the weak involvement of business firms in R&D until recently.

The challenges faced by the Portuguese R&D and innovation system are as follows:

- *Improving strategic policy design, coordination and medium-term consistency*, in order to overcome the traditional divide between science and enterprise policies. There is a need to establish a proper governance structure that might contribute to the development of a systemic approach to R&D and innovation policies, overcoming ministerial 'frontiers' Another relevant issue is the adoption of a medium to long term policy perspective that might guarantee the stability of the main policy headlines, independently of governmental changes.
- *Improving the systemic density and the efficiency along the system*: Portugal fares better in creating conditions for R&D and innovation than in translating these conditions into competitive performance. So far, the significant effort undertaken in enhancing R&D capabilities has not led to a clear change in the way how companies compete in international markets. Addressing these issues is essential to stimulate a closer dialogue and interaction between research, entrepreneurship and business activities, so that systemic density is increased.

An important challenge in the near future is how to deal with the difficulties in financing public and university research as an opportunity to strengthen the linkages with company capabilities and needs.

- *Changing from a broad range research policy to a more selective research policy, based on a set of priority scientific fields:* The significant achievements of the Portuguese R&D policy over the most recent decades took place in the context of a broad range policy, without discriminating among the different research fields. More recently, the former government had already provided signs of an increased targeting at specific fields, as the creation of the Iberian International Nanotechnology Laboratory (INL). The challenge is now to successfully implement the change from a broad range to a more selective approach to research policy. In [its programme](#) the new Government expressed the intention to keep allocating funds on the basis of “excellence” and to open calls for “all scientific fields”, but at the same time identified life sciences and health as key research areas. This may be interpreted as opening the way to a more targeted approach to research policy.
- *Stimulating the emergence of new companies, both domestic and foreign-owned, particularly in knowledge intensive activities:* The low share of companies engaged in knowledge intensive activities in Portugal does not ensure structural change. This would require not just the promotion of skilled entrepreneurship but also the attraction of knowledge-intensive inward investment. A committed, long-term work is needed in these fields. A related topic is the increase of the knowledge content in traditional industries. The example of footwear shows that this may be a promising path to follow. It requires the combination of traditional craft skills with sophisticated technological and marketing knowledge.
- *Strengthening SMEs in-house capabilities at the technological, organisational and marketing levels:* There is a need to improve the in-house capabilities of SMEs as well as inter-firm cooperation to enhance SMEs competitiveness in international markets. In this vein, the focus on technological capabilities is not enough. It should be combined with initiatives to promote organisational and marketing capabilities. These are key to develop innovative approaches enabling the companies to improve their performance in international markets. In particular, specific initiatives should be launched with a view to enable the most innovative companies to introduce successfully their new products and technologies in the most high value and sophisticated markets.

As a consequence of a re-orientation of national policies, and in contrast to the previous Community Support Framework programmes, the NSRF 2007-2013 was marked by a concentration of measures regarding innovation and research under the same programme (the Competitiveness Factors Operational Programme - COMPETE). This concentration stemmed from a diagnosis (see Godinho and Simões, 2005) which highlighted the weak coordination of sectoral programmes and measures addressing research and innovation goals. The NSRF entailed a much stronger focus on increasing extramural R&D carried out in cooperation between business firms and the research sector. The main measure concerning this objective has been the establishment of the “collective efficiency strategies”, aiming at stimulating different forms of cooperation and clustering among different actors, namely through the establishment of Competitiveness

and Technology Poles (CTP). Further measures stimulating research cooperation include: “Collective RTD projects”, “Mobilising”, the “Co-promotion projects”, “R&D Consortia” and “RTD Vouchers”. Several other measures which have been established with the aim of bridging the policy gap between “innovation” and “research” include: the setting up of a network of 23 GAPI (IPR support offices) and a network of university technology transfer and licensing offices (OTICs). There is also support to encourage the carrying out of innovative R&D projects in firms. New indigenous R&D performing firms, the most important of which regards “Entrepreneurship Projects”, while at the regional level, measures intended to promote Science and Technology Parks have been introduced. In addition to the NSRF measures, there have been other policy measures whose central objective has been to stimulate private R&D investment, the most important of which has been SIFIDE, a system providing tax credits to investments in R&D.

In what regards research policy driven towards scientific development, a stable set of horizontal priorities has been pursued since before 2000. The most important of those priorities were: bringing Portuguese science to the levels of excellence of the leading countries in different disciplinary areas; promoting the internationalisation of the Portuguese academic community; and setting up a machinery of support for the research system. As a result of this strategy the country was able to build a significant scientific capability, though the degree of connection of this research capability with innovation capacity has remained weak.

The government that was established in the June 2011 election did not make any significant changes to the innovation and research strategy until early December 2011. An area where changes were hinted is innovation financing, since the Government programme explicitly provided for the strengthening of companies’ own capital and the rationalisation of venture capital instruments. These ideas have been translated into the [Strategic Programme for Entrepreneurship and Innovation](#), approved by the Council of Ministers in December 7th 2011. This new Programme is based on four main pillars: (1) enhancing citizens’ competencies; (2) encouraging innovation; (3) stimulating entrepreneurship; and (4) launching more appropriate financing instruments.

The current economic climate is seriously inhibiting firms from investing and pursuing a consequent innovative strategy. The need of rejuvenating the business sector through both the improvement of the capabilities of existing firms and the creation of a larger sector of new knowledge-intensive firms has been aggravated by the current dire conditions of the economy. However such trajectory needs to be pursued by all means, as a way of not losing for good the scientific capacity that the country was able to build.

The policy mix is now reasonably comprehensive, as pointed out in earlier reports (Godinho and Simões, 2009 and 2010; Simões and Godinho, 2011). The set of measures provided in the NSRF 2007-2013 is generally appropriate, insofar it addresses the main challenges identified. The fields in which, at the time of writing, the mix has more shortcomings regard the promotion of entrepreneurship and the provision of managerial support to SMEs.

The main bottlenecks to respond the challenges identified do not lay therefore in the set of specific measures, but rather on other issues. The efficiency and effectiveness of the policy mix is seriously undermined by two problems. The first is the insufficient

coordination among the different policy perspectives which precludes the development of a systemic approach to tackle the challenges. The second is the dominance of a “linear model” perspective. It is assumed that investment in science and the “transfer” of scientific knowledge to companies would be the key to ensure an innovation based competitive approach

The existing policy mix which has been set up with the help of the EU over the previous two decades have allowed national research and innovation policies, in combination with other important areas of the policy mix, to become comprehensive and with proper targets. In this sense the policy-tool box in Portugal does not compare poorly with the more advanced economies. The reason why they have not been that effective lies in the macroeconomic aspects indicated above, but also on institutional aspects that have barely been dealt with by the structural policies and which affect entrepreneurship, risk-taking, collaboration, creativity and innovativeness. The analysis of the policy mix indicates a broad alignment with the ERA objectives. The initiatives implemented in Portugal run across all ERA dimensions, although some important challenges and shortcomings still persist.

The systemic interaction between science and innovation needs to be brought to the forefront of the strategy, as the country has developed a pronounced dualism in terms of science (stronger) and technology/competitiveness (weaker) capabilities. The virtues of the linear model approach are virtually exhausted. The move towards starting to define thematic research priorities which happened in recent years has not been aligned with business interests. Policy instruments which have been implemented (CTP and other poles and other joint-platforms) though having generated some advances, need to go further actually to integrate academic research with innovation capacity. Simultaneously, policy initiatives aimed at promoting entrepreneurship, the attraction of foreign investment and the upgrading of SMEs technological, organisational and marketing capabilities need to be further developed.

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1 Introduction

With a population of [10.6 million people](#), Portugal has a 2.1% share of the EU-27 population, while in terms of GDP her share is smaller, standing at 1.4% in 2011. These figures translate into a [GDP per capita at market prices of €16,222](#), which is equivalent to 80% of the EU average if measured in parities of [purchasing power \(ppp\) in 2010](#). [GDP growth has been volatile](#), with 0% in 2008, -2.9% in 2009, 1.4% in 2010 and -1.9% in 2011. [The forecast for 2012](#) is negative, with GDP expected to fall by -3.0%.

The most recent R&D data, which refer to the period before the 2011 recession, show a quite different situation. By 2009 Portugal had advanced to a GERD/GDP ratio of 1.66%, with the business sector becoming since 2007 the most important R&D performer, boasting a 47.0% BERD/GERD share in 2009. It must be recalled that one decade ago Portugal was still well below the 1.0% mark. As however the GERD/GDP ratio is still below the EU-27 average value of 2.0%, one easily infers that the Portuguese share in the EU-27 total GERD (slightly above 1.1%) is naturally below both its population and GDP shares. Moreover despite the positive evolution of the business sector its contribution to total GERD (47.0%) is also below the EU-27 average (62.2%).

The positive performance in terms of R&D until 2009 stems from a strong and sustained commitment to increase both the amount and the quality of the research performed in Portugal. Since the mid-1990s there has been a policy of providing support for research units based on the quality of research output, assessed by international evaluation. The policy of promoting post-graduate education has also played an important role in increasing the supply of human resources. This led to a significant growth of both the input and the scientific output of the research system. In recent years, Portugal has attracted foreign researchers. By 2009, in accordance to a study produced by [GPEARI](#), there were 1,523 PhD trained foreigner residents carrying out R&D activities in Portugal. Two important research infrastructures, one publicly- and the other privately-owned, were recently launched: the [Iberian International Nanotechnology Laboratory \(INL\)](#), a Portuguese-Spanish joint-venture focused on nanosciences and nanotechnologies research; and the [Champallimaud Research Centre](#), inaugurated on October 5, 2010, dedicated to translational medical research on cancer and neurosciences.

A long and fruitful way has been pursued to strengthen research activities in Portugal. The downside, however, is knowledge exploitability. Science policy has just concerned increasing the human resource stock and improving research quality and scientific performance, the exploitability of knowledge production being a rather secondary concern.

The sustained commitment to expanding the input for the research system is shown by the data provided in a 2009 study by [GPEARI](#) on the professional situation of doctorates in Portugal: full time equivalent (FTE) researchers more than doubled in 6 years, reaching 8.2 per thousand in 2009, with a very high share of women in this total (44%); the number S&T graduates as a share of the population in the 20-29 years age cohort increased from 1.2% to 2.1% from 2005 to 2008; and the annual number of new PhDs has steadily increased, from 1,027 for 2003 to 1,496 for 2008 with the share of new PhD

holders in the sciences and engineering fields reaching 0.45 per 1,000 individuals in the 25-34 years age cohort.

The effort reported above has been translated into a significant improvement in research output. This will be assessed on the basis of the scientific publications and patent applications. With regard to scientific publications, [data released by GPEARI](#) indicates that the number of ISI publications per million inhabitants for 2010 reached 832, an increase of 123% as against 2004. Though partly due to the low starting basis, the growth is remarkable, leading the indicator for Portugal to correspond to 81% of the EU average in 2010, compared to 52% in 2004. Patent statistics indicate a significant growth in international patenting. Between 2004 and 2010, the [number of USPTO filings](#) experienced a 3.7-fold increase, reaching a total of 111 in 2010, while between 2004 and 2009 the [EPO filings](#) recorded a two-fold increase, reaching a total of 206 in 2009. In spite of this growth, patents continue to be the weak link of Portugal's research output. This situation reflects the insufficient concern with exploitability. As pointed out in a previous EW Country Report for Portugal (Godinho and Simões, 2009), there has been an implicit assumption that the effort in the provision of highly skilled human resources and in encouraging research quality and internationalisation would, sooner or later, lead to changing the economic fabric. However, this idea has not materialized. Exploitability of research outputs is very limited. It may even be argued that the focus on international research standards led to an increased gap between the scientific and the business worlds.

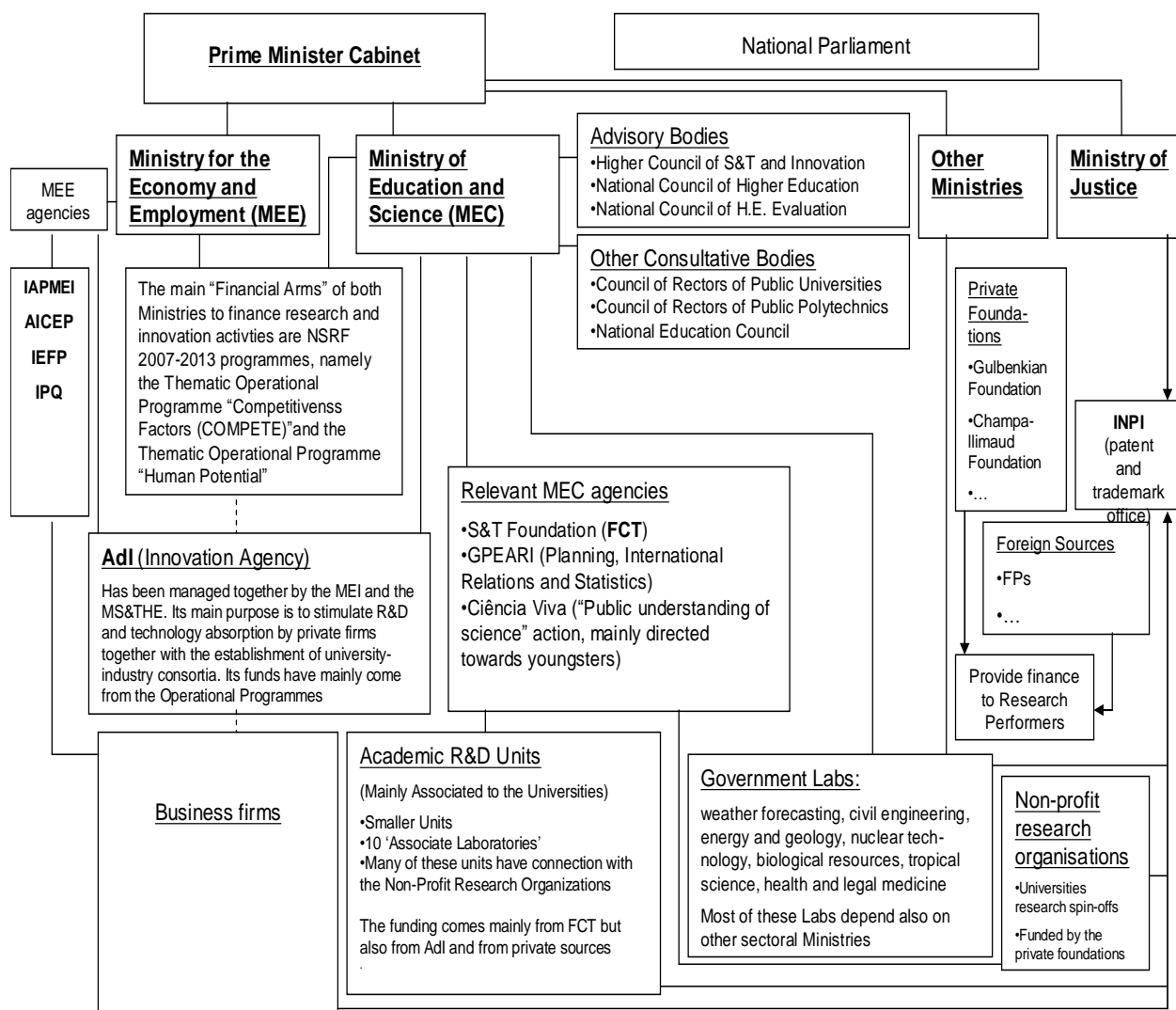
The structural composition of the economy has undergone important changes over the most recent decades. A joint VW-Ford investment to build a large car manufacturing plant in 1991 induced a progression of the specialisation from low- to medium-tech industries. Further, the increasing urbanisation and general economic development has led to a growth in the services sector that is now in line with what is typical of the most developed economies, with a consolidation of a KIBS (Knowledge Intensive Business Services) segment supplying advanced services, though mostly focused on the domestic market. The structure that emerged in the 1990s has not however undergone through further changes over recent years, as incoming FDI slowed down and the larger domestic firms have not sought to position themselves in higher tech- and knowledge-intensive activities. This structural stickiness has been aggravated by the recession, as gross fixed capital formation has declined. This situation reflects itself in a climate of weak knowledge demand for universities' research. The incapacity of the business sector to define a clear agenda for what sort of contributions it might seek from the research sector, which with a few exceptions has characterized the national innovation system so far, will therefore remain, at least in the short term.

Despite the positive performance of the business sector in recent years, R&D governance is still largely dominated by the public sector. The research system has been marked by a high degree of centralisation. All the major decisions have been taken by the government, namely through the Ministries involved which, since June 2011, have been the Education and Science Ministry and the Economy and Employment Ministry. The national parliament has had a weak involvement in issues concerning research and innovation policies. The formal structures for hearing the main stakeholders have only occasionally been used. However, on the 7th of December 2011

a decision was taken to create a National Council on Entrepreneurship and Innovation (CNEI) to be chaired by the Prime Minister.

The emergence of a proper academic research system in the last few decades has been made possible through the combination of national and EU structural funds. The funding of this system has been mainly managed by FCT (Foundation for S&T), the entity which operates as the national research council. The FCT provides the basic funding for the R&D units for periods up to five years and organizes their regular evaluation. Further FCT provides competitive R&D funding, manages the doctoral and post-doc programmes and performs a pivotal role in scientific international relations. The weak involvement of business firms in R&D activities until very recently has resulted in a weak participation of the private sector in the overall governance of the research and innovation system.

Figure 1: Organisational Chart of the National Innovation Governance System



Source: Adapted from figure available in [ERAWATCH Research Inventory 2009](#) and from EW Mini Country Report/Portugal.

2 Structural challenges faced by the national system

In spite of the improvement of the country's position in international rankings (see for instance European Union, 2011b), Portugal suffers from a set of interrelated structural challenges that seriously hinder the transformation of a raising and committed investment in R&D, evident in the last 15 years, into increased competitiveness. Such challenges become more acute under the harsh financial economic and budgetary conditions the country is presently facing. As the Innovation Union Competitiveness Report argues, "in order to increase its economic competitiveness by raising its productivity and changing the structure of exporting enterprises, Portugal will have to maintain its efforts in increasing its investments in Research and Innovation" (European Commission, 2011a: 193). The issue is, however, how to mobilise enough funds to support such a policy under a drastic austerity programme.

According to the IUS 2011, Portugal is included in the "Moderate innovators" cluster, together with inter alia Spain, Italy, Greece, the Czech Republic and Poland (European Commission, 2011b). A look at the eight dimensions of the IUS 2011 indicates that Portugal ranks better than her 'Moderate innovators' peers in the following dimensions: Characteristics of the research system; Finance and support; Linkages and entrepreneurship; and Innovators. Portugal ranks first among her peers on all those dimensions, with the exception of the Characteristics of the research system, where she ranks second, after Spain. A caveat however exists in several of these dimensions. In Finance and support, there is a contrasting performance in the indicators: while public R&D expenditures are very close to the EU average, venture capital is clearly below and shows a declining trend. The good marks in the dimensions "Linkages and entrepreneurship" and "Innovators" are mostly due to the indicators taken from the Community Innovation Survey, whose data suffers from several shortcomings (Simões, 2008). The dimensions in which Portugal's performance is lower are "Human resources" and "Economic effects". In spite of the very significant effort in doctoral education, secondary and tertiary education levels are still well below the EU average. (European Commission, 2011b: 44).

In fact, both the Innovation Union Scoreboard and the [COTEC Innovation Barometer](#) show that Portugal fares better in creating conditions for R&D and innovation than in translating such conditions into competitive performance. As mentioned above, the investments undertaken in enhancing R&D capabilities have not led so far to a significant change in the way how companies compete in international markets. The Portuguese levels of employment in knowledge intensive activities, of medium and high tech manufacturing exports and of knowledge-intensive services exports correspond, respectively, to 67, 75 and 62 per cent of the EU average values (European Commission, 2011b).

This analysis leads to the identification of several structural challenges, briefly presented below.

Improving strategic policy design, systemic density and coordination among the RDI system actors

The divide between science and enterprise policies has historically been a major hindrance to the quality and consistency of the RDI system (Caraça, 1999; Godinho and

Simões, 2005). In spite of some attempts to bridge it, namely the Technological Plan and the new structure of the National Strategic Reference Framework 2010-2013, a coherent policy has not been achieved so far. The recent [Strategic Programme for Entrepreneurship and Innovation](#) is aimed at responding to this problem. There is the possibility, however, that the diversity of matters assigned to the Ministry for the Economy and Employment, including public works and transportation and, of course, employment, might make innovation a less relevant concern. Time will show whether the launching of the +E+I Programme will in fact contribute towards an improved coordination between science and enterprise policies.

A related issue concerns the weak involvement of the various stakeholders, namely companies, in the process of designing RDI policy. It is relevant to activate the existing *fora* for stakeholder consultation, which have not been operational. This is essential to stimulate a closer dialogue and interaction between research, entrepreneurship and business activities.

Strengthening the systemic density also means the promotion of interactions among the players in the system. The launching of cluster policies, namely the [CTP - Competitiveness and Technology Poles](#), was meant to foster the cooperation among the various stakeholders. Although no evaluation of this policy has been carried out so far (it is expected to take place in the second half of 2012), available evidence suggests the existence of some successful initiatives, which have contributed to an increased competitiveness at sectoral level, while other have lingered, being unable to mobilise change. The expected evaluation should enable some pruning of the initiatives, to avoid the assignment of scarce resources to unsuccessful activities and concentrate public support on those which have shown to effectively promote systemic interaction and structural change.

An increasing concern is how to deal with the difficulties in financing public and university research as an opportunity to strengthen the linkages with company capabilities and needs. This would demand measures that might make easier the circulation of people between companies and research organisations. This might be a way to combine the body of understanding (characteristic of university activities) with the body of practice (characteristic of company activities). Such an interaction is much more promising than the misleading, linear model-based concept of technology transfer, so widespread in national (and European) policy approaches.

Moving from a broad range research policy to a more selective one, focusing on a set of priority research fields

The significant achievements of the Portuguese R&D policy since the late 1980s took place in the context of a generic policy, without discriminating among the different research fields. The rationale for such a policy was the fact that Portugal still had a long way to go: scientific backwardness had to be addressed in a broad, horizontal perspective. The situation is now different. Portugal has reached a status which is, in many regards, is close to or even above the European average, as is the case of “New doctorate graduates” or “International scientific co-publications” (European Commission, 2011b: 44).

This demands a different approach, particularly in a context of budgetary constraints. The former government had already provided signs of an increased targeting at specific

fields, as the creation of the Iberian International Nanotechnology Laboratory (INL) suggests. The new Government expressed the intention to pursue the bet on “excellence” and to open calls for “all scientific fields”, but at the same time elects life sciences and health as a key research area ([Programa do XIX Governo Constitucional, 2011](#)). This may herald a new approach to science policy.

Stimulating the emergence of new companies, both domestic and foreign-owned, particularly in knowledge intensive activities

One issue that clearly emerges from the Innovation Union Competitiveness Report is the low share of employment in knowledge intensive activities in Portugal (about 67 per cent of the EU average). It is true that such share is growing (European Commission, 2011a: 382). But the pace has not been high enough to ensure structural change. Further effort is needed. This would require not just the promotion of skilled entrepreneurship but also the attraction of knowledge-intensive inward investment. In this field, a committed, long-term strategy is needed. In the beginning of the decade Portugal was successful in attracting a few foreign R&D investments. The [Government programme](#) states the intention to devote a stronger effort in this regard. However, achieving success is not easy: it demands a very professional and consistent implementation, the development of bridging capabilities (for instance, research organisations, suppliers...) and focus on the priority areas defined.

A related topic is the increase of the knowledge content in traditional industries. The example of the footwear sector shows that this may be a promising path to follow. It implies the combination of traditional craft skills with sophisticated technological and marketing knowledge. The consequence is the upgrading of companies’ positions in international value chains.

Strengthening the SMEs in-house technological, organisational and marketing capabilities

The education levels of the Portuguese population are lower than EU average: as mentioned above, the share of population in the 30-34 cohort, which completed tertiary education is 65 per cent of the EU average, while the share of the population in the 20-24 cohort with upper secondary level education is 71 per cent of the EU average (European Commission, 2011b). This is reflected in company capabilities. Managerial capabilities are limited, especially in traditional industries, in which many companies were created by former employees, with some entrepreneurial drive, but lacking a sound knowledge basis (Vicente, 2006). The need to leave the domestic market “comfort zone” and engage into international activities, particularly through exports, makes the strengthening of in-house capabilities badly needed. This issue has been recognised in innovation policy statements (see, for instance, the Technological Plan and the National Strategic Reference Framework 2007-2013), and was translated into a few initiatives aimed at contributing to enhance SMEs’ innovation capabilities. An interesting example was the [NITEC programme](#), aimed at supporting the setting up of dedicated R&D teams in companies.

There is, however, a need to pursue and improve such programmes, since they are essential to enhance SMEs competences to innovate and compete in international markets. In this vein, the focus on technological capabilities is not enough. It should be combined with initiatives to promote organisational and marketing capabilities. These

are key to develop innovative approaches enabling the companies to improve their performance in international markets. In particular, specific initiatives should be launched with a view to enable the most innovative companies to introduce successfully their new products and technologies in the most affluent and sophisticated markets.

3 Assessment of the national innovation strategy

3.1 National research and innovation priorities

To analyse the national innovation strategy there is a need to consider two distinct levels. The first one has to do with the structural policies, which are related to the pluriannual NSRF (see further below on the NSRF), and the second one has to do with the government policies, which are limited by an electoral cycle that is shorter than the one of the structural policies. The national government determines the structural policies in the moment of its inception or through possible adjustments over its implementation. The NSRF is thus at the programming level of the policymaking cycle. In practice, the NSRF acts as the funding source of the policies set by the successive governments. The election that took place in June 2011 led to a replacement of the former Socialist majority by a centre-right majority. This change has had some implications, which are identified below for the research and innovation priorities.

Portugal has been promoting since 2007 the [National Strategic Reference Framework 2007-2013](#) (NSRF). As with the three Community Support Frameworks (CSFs) that preceded it, the NSRF 2007-2013 combines EU and national funds to address structural weaknesses. The NSRF aggregates a set of operational programmes and measures, namely in the fields of research and innovation. The NSRF, like the CSFs that preceded it, is the main source of resources for funding research activities.

In contrast to the previous CSFs, the NSRF 2007-2013 was marked by a concentration of policies regarding innovation and research under the same programme (the Competitiveness Factors Operational Programme, briefly known as [COMPETE](#)). This concentration stemmed from a diagnosis (see [Godinho and Simões 2005](#)) which highlighted the weak coordination of sectoral policies addressing research and innovation goals. The challenge was to provide a more systemic approach in these policy areas, in order to strengthen the national innovation system. In the architecture of the NSRF and particularly of the [COMPETE](#) programme there were measures stimulating research cooperation between the business sector and academia, others geared towards endogenous R&D and innovation in firms, and others falling within the scope of traditional science policies. The strategic objectives elected by the NSRF concerned systemic integration and development, improving the framework conditions for business firms carrying out R&D and innovation and to keep science evolving along the development trajectory it had undergone in the previous decades. [The 2010 intermediate overall evaluation of the NSRF](#) has highlighted that despite the advances in terms of policy design, the degree of practical integration of different areas has remained low.

With the overall objective of promoting systemic integration, the [NSRF](#) entailed a much stronger focus on increasing extramural R&D carried out in cooperation between

business firms and the research sector. The main measure concerning this objective has been the establishment of the “collective efficiency strategies”, aiming at stimulating different forms of cooperation and clustering among different actors, namely through the establishment of Competitiveness and Technology Poles ([CTP](#)). Further measures stimulating research cooperation include: “Collective RTD projects” (led by business associations to respond the technology development needs of their members); the “Mobilising projects” (involving companies and R&D organisations); the “Co-promotion projects”, (again through partnerships between companies and RTD organisations); the “R&D Consortia” (usually led by R&D organisations, to develop specific research projects involving research organisations and business firms); and the “RTD Voucher” (granted to a company to benefit from R&D services).

There have been no systematic studies about each of these measures which are part of the NSRF 2007-2013. The situation is that the demand for the measures has been generally quite high, but at the same time there has been a significant gap between the rate of project approval and the actual implementation of the projects. Further, some key measures as the CTP poles, have shown a very unbalanced pattern of advance, with some poles (like the [Health Cluster Portugal](#) or the [food industry cluster](#)) operating actively and others not so much. The [intermediate overall evaluation of the NSRF 2007-2013](#) indicates that the low degree of strategic integration between the three main thematic areas (competitiveness, human resources, regional development) has remained as a key-issue.

In addition to the NSRF measures, there have been other policies whose central objective has been to stimulate private R&D investment, the most important of which has been [SIFIDE](#), a system providing tax credits to investments in R&D. This measure, which has now existed for a decade with a brief interruption in 2005, was restated by the Budget Law for 2011, which established SIFIDE II.

Another policy field where awareness has been emerging in recent years concerns organized public procurement of innovative goods and services. The most striking example is the implementation of the Magalhães computer project. This project involved the development of a very basic portable notebook computer to be distributed among school children aged 7-10 years old. This required the building of a resilient machine with proper software inside.

The former government issued two important policy documents, which were meant to provide a revamped frame for innovation policy. Those two documents were, respectively, the [Agenda Digital](#), disclosed in November 2010, and [Portugal 2020](#), disclosed in March 2011. These two initiatives were set in line with the Europe 2020 strategy. The [Agenda Digital](#) aimed at improving the services rendered to citizens and economic agents, anchored in new generation networks and in the “support to companies and company consortia to internationalise and export the goods and services developed”. The purpose of the Agenda Digital was to promote an increased use of ICT as a way to foster innovation, in both the economic and the social fields. In practice, Agenda Digital encompassed the main innovation policy measures which were already being pursued, some of them anchored in earlier initiatives of the [Technological Plan](#). [Portugal 2020](#) was set as a proxy to the National Reform Plan (NRP) putting forward ambitious targets for 2020, including a GERD target of between 2.7% and 3.1% of the GDP by 2020, which would put the country at the same level as the EU overall.

The government that took office after the June 2011 election announced on December 16th, 2011 the Programa Estratégico para o Empreendedorismo e a Inovação +E +I (Strategic Programme for Entrepreneurship and Innovation) +E+I aims at promoting entrepreneurship and innovation. Its main strategic objectives are the following: creation of a more entrepreneurial society; expanding the basis of innovative and export-orientated companies; promoting a networked country, integrated in international knowledge, entrepreneurship and innovation networks; and to ensure better investments and better outcomes. In the field of entrepreneurship, there is a concern to create an environment favourable to the emergence of excellence initiatives and projects. The measures contained in this new programme coincide essentially with several measures which were already under implementation with the financing of the NSRF 2007-2013 programmes.

Concerning research policy driven towards scientific development, a stable set of horizontal priorities has been pursued since before 2000. The most important of these have been: bringing Portuguese science to the levels of excellence of the leading countries in different disciplinary areas; promoting the internationalisation of the Portuguese academic community; and setting up a machinery of support for the research system.

Some changes have however happened in recent years, with the set of horizontal priorities being enlarged towards integrating some thematic priorities. First, the [reform of the government laboratories](#) identified several scientific and technological fields requiring a stronger focus and a call was launched for the creation of R&D consortia in six specific fields.¹ Second, the “[Partnerships for the Future of Portugal](#)”, which included agreements with several US Universities and the Fraunhofer Gesellschaft addressed well-defined thematic areas, namely energy, advanced computation, security and health. Third, the creation of the Iberian Nanotechnologies Laboratory ([INL](#)) portrayed a specific concern with this techno-scientific field. Fourth, the “Commitment to Science” initiative in 2006 identified some specific areas of concern, namely it stated that research should address energy, transportation and logistics, manufacturing technologies, telecommunications and IT networks, software engineering, robotics, digital contents and multimedia, and biosciences. These areas have generally been pursued under international collaborative initiatives, namely through the ERA-NETs.

From the perspective of the overall policy mix impacting research and innovation, several other aspects should be highlighted. As a follow up of former national policies, the NSRF 2007-2013, under the Human Potential thematic programme, established important measures in this area. Three types of intervention have been pursued: PhD and Post-Doc grants; promotion of scientific employment through specific incentives for integration of scientists and engineers in business firms and research entities; grants and other measures to support the involvement of graduate students in R&D activities and international mobility. The promotion of a scientific and technological culture has also been envisaged as essential for the modernisation of the country. The Ciência Viva

¹ These six areas are as follows: a) Biosciences and biotechnology, with emphasis on applications in agriculture, forestry and fisheries; b) Physics and advanced computing; c) Public risks; d) Oceanography and sea sciences and technology; e) Space science and technology; and e) Promotion of Portuguese participation in European Defence R & D policy.

Agency has played a very important role in this regard. For the improvement of young researchers' employment prospects, the main instrument has been the promotion of the employment of masters and PhD holders by companies and technology centres. Further the [Commitment to Science led](#) to the establishment of 1,000 jobs for young PhD holders in R&D organisations.

Two evaluation exercises were undertaken recently in connection with the [NSRF](#). One of them, mentioned above, was the [mid-term evaluation of the NSRF 2007-2013](#) and the other analysed one of its operational programmes ([COMPETE](#)). The first of these evaluations was broadly positive, although it calls for the need for strengthening the strategic dimension of the NSRF, particularly on the consistency of the three thematic operational agendas (Competitiveness, Human Potential and Territorial Valorisation). Regarding innovation, the evaluation is positive. It underlines that company investments are following a trend which is more geared towards higher technology intensity, increased knowledge integration, value chain improvements in traditional industries and the emergence of value added export industries. The second evaluation was specific to the COMPETE Programme. It dealt with organisational and management issues, namely the adaptation of the policy instruments to a new economic reality, and not so much with the economic impacts of innovation policy. According to the information collected, the overall assessment is positive in terms of selectivity, take-up of innovation and competitiveness measures and governance model. The evaluation points out, however, that there is a need for a better project follow-up. It also remarked that, though tangible investments keep the majority share in the investments supported, there has been an increased opportunity for intangible investments.

Apart from the generally positive results of these two evaluation exercises, which focus on the period before 2011, the main problem now seems to lie more on the current economic climate, which is seriously inhibiting firms from investing and pursuing a consequent innovative strategy. The need to renovate the business sector through both the improvement of the capabilities of existing firms and the creation of a larger sector of new knowledge-intensive firms, which was highlighted in the previous section about structural challenges, is severely limited by the dire conditions of the economy. However such trajectory needs to be pursued by all means, as a way of not losing for good the scientific capacity that the country was able to build.

3.2 Trends in R&D funding

The Portuguese research and development (R&D) situation has been changing rapidly in recent years, with the country reaching a GERD/GDP ratio of 1.59% in 2010 (provisional information). The business sector has become since 2007 the most important performer in the R&D system. The most recent information available, released late in 2011, indicates that the business share in the national GERD was 45.5% in 2010.

The national R&D budget has been on the rise, at least until 2012. While in 2006 GBAORD was €1,116m, in 2009 it reached €1,552m. Moreover for 2010 and 2011, in accordance to [provisional figures reported by GPEARI](#), GBAORD kept growing, being the amounts respectively €1,765m and €1.820m.

These recent dynamics of growth have been above the EU average, bringing Portuguese R&D intensity closer to the EU average (1.6% versus 2.0%).

However the 2010 R&D survey already indicates a drop in the business firms' investments in R&D. Further it must be pointed out that the GBOARD data reported above refers to the budget perspective and not to actual expenditure (according to the 2008 R&D survey R&D funded by government was €1,130m in that year).

The government that stepped down in June 2011 had set a R&D/GDP ratio target of between 2.7%-3.3% for 2020, with the public sector contributing 1.0%-1.2% and the private sector 1.7%-2.1%. In the current climate these figures seem too ambitious. This target was set out in the [Portugal 2020](#) document.

Table 1: Basic indicators for R&D investments in Portugal

	2008	2009	2010	EU average 2010
GDP growth rate	0.0	-2.9	1.4	2,0
GERD as % of GDP	1.5	1.64	1.59	2.0
GERD per capita	243.5	260.1	258.3 P	490.2
GBAORD (€m)	1,479,8	1,549,1	1,763,4	92,729.05
GBAORD as % of GDP	0.86	0.92	1.02	0.76
BERD (€m)	1,295,1	1,311,1	1 248.8 P	151,125.56
BERD as % of GDP	0.75	0.78	0.72 P	1.23
GERD financed by abroad as % of total GERD	3.0	4.1		N/A ²
R&D performed by HEIs (% of GERD)	34.5	36.4	37.0 P	24.2
R&D performed by PROs (% of GERD)	7.3	7.3	/2 P	13.2
R&D performed by Business Enterprise sector (as % of GERD)	50.1	47.4	45.5	61.5

Sources: Eurostat and INE.

As regards government funding of academic R&D, the proportion of institutional funding has been rising, even though two contradictory trends have co-existed, as the share of the government labs has been declining and the share of university R&D units and institutes (namely the so-called “associate labs”) rose further over the last decade.

As regards government funding of business R&D, the main trend has been the relative growth of tax incentives vis-a-vis competitive funding through R&D grants to firms. Tax incentives have been provided through SIFIDE, which corresponds to a tax credit assigned to R&D performing companies. It is interesting that, in spite of the financial difficulties, the level of incentives granted under SIFIDE for fiscal year 2011 were higher than for 2010, including a credit for the recruitment of high-skilled staff.

² 8.4 (2009), 9.04 (2005)

In relation to the competitive funding for firms, funds have stemmed from the programmes co-funded by the ERDF and ESF. The recent economic and financial crisis seems to have led to an increased difficulty by firms to generate complementary financing to participate in these programmes, as a consequence of the credit crunch. As a matter of fact in 2009 and 2010 there was a decline in private sector co-financing, due to the measures taken to withstand the crisis.

Most funding is not thematically or sectorally focused. Though with some exceptions, the Portuguese tradition has been to have general incentive systems which do not address specific industries, technologies or scientific fields. Therefore the bulk of funding is assigned to projects or institutions on the basis of their general eligibility and merits, and not from a thematic or sectoral perspective. Having said this, there are exceptions, as is the case of the collective efficiency strategies (particularly [CTPs](#) and [Other Clusters](#)), where the clustering theme is key.

The proportion of direct international funding is not high (between 3% and 4% in recent years), but this does not reflect the European structural funds which are delivered through national programmes.

3.3 Evolution and analysis of the policy mixes

The national innovation policy mix for the last 20 years has been very much influenced by the launching of the successive Community Support Framework programmes (CSFs). These have defined the main features and measures under the policy mix. We concur with the view that “one cannot state that a true integrated science, technology and innovation policy has existed in Portugal” (Laranja, 2007: 185) and that EU funds “have been the main instrument” for action in that regard (Laranja, 2007:186). The policy mix has also been influenced by government changes, often leading to significant policy reorientations.

During the last three years, that is, from December 2009 to November 2011, the policy mix has remained quite stable. In fact, the main policy measures under the present CSF, now called National Strategic Reference Framework ([NSRF](#)) 2007-2013, were launched in 2007/2008, and no major changes were made so far. As pointed out in section 3.1 above only one major initiative was taken in recent years: the launching of the [Agenda Digital](#) (Digital Agenda), aimed at improving the services rendered to citizens and economic agents, anchored in new generation networks and in the “support to companies and company consortia to internationalise and export the goods and services developed” (Simões and Godinho, 2011). More relevant however, have, been the budgetary and financial constraints that have significantly curtailed the take-up of the policy measures, namely in the innovation field, by companies. In fact, the credit crunch has severely limited SMEs access to bank loans (Simões, 2009), thereby reducing their possibilities to carry out investments, even with public support. Export intensity, measured by the ratio of exports to turnover, has been introduced as an eligibility condition for firms applying for support under the NSRF 2007-2013 company support systems. The concern with international competitiveness, namely with export promotion, became a key cross-cutting priority for economic policy, including innovation policy.

The new government, which took office in late June 2011, did not make any major changes in the R&D and innovation policy mix until early December 2011. Interestingly,

the tax incentive system ([SIFIDE](#)), which provided a favourable treatment to investments in R&D, has been reinstated for 2012 (Orçamento de Estado, 2011), in spite of the budgetary constraints. In contrast, the commitment to the carrying out of the [Digital Agenda](#) significantly declined. A [Strategic Programme for Entrepreneurship and Innovation](#) (Council of Ministers Resolution 35/2011) was approved on the 7th of December 2011 with a view to promote innovation and entrepreneurship. This new Programme is based on four main pillars: (1) enhancing citizens' competencies; (2) encouraging innovation; (3) stimulating entrepreneurship; and (4) launching more appropriate financing instruments. A new Competition law is also being developed. The main changes concern the granting of increased power to the Autoridade da Concorrência (Competition Authority) to investigate anti-competitive practices. However, that will have no immediate implications for R&D and innovation policies.

- Looking at the policy mix from the perspective of the IU self assessment tool, it is possible to identify the main strengths and weaknesses of Portugal's R&D and innovation policy mix. The main strengths are identified below. Unfortunately, most of these strengths are subject to qualifications, to a large extent as a result of policy changes stemming from the need to curb public expenditure and the credit crunch:
- A broad perspective of innovation policy, going beyond technological research and its applications: in spite of its name, the [Technological Plan](#) espoused a wide approach to innovation, including demand-side innovation issues. However, the Technological Plan as such has been discontinued since 2009:
- Before the strengthening of the sovereign debt crisis there has been an "adequate and predictable public investment in research and innovation"; this is, however, at stake due to the stringent financial conditions faced by the country;
- Excellence has been a key criterion for allocating resources to research, though the same could not be said about education policy;
- Partnerships between higher education institutes, research centres and businesses have been promoted, particularly in the context of the cluster policy (Competitiveness and Technology Poles [CTP] and Other Clusters), launched in 2008; however, there are doubts about the effectiveness of such endeavours, particularly on what concerns the capabilities and dynamics of some CTPs and clusters (an evaluation exercise is expected to take place soon); and
- There is in place a wide array of policy instruments that cover most of the relevant fields in R&D and innovation policy (although their implementation sometimes leaves much to be desired).

In contrast, there are major weaknesses which significantly hinder the effectiveness of the policy in bringing about fast change in terms of innovation behaviour and economic competitiveness. These are related namely to the dominance of the "linear model" in policy design (Laranja, 2007), the weaknesses of the education system (Crato, 2006) and the insufficient capabilities in the public sector (Godinho and Simões, 2005; Mateus and associados, 2010).

3.4 Assessment of the policy mix

The policy mix is now reasonably comprehensive, as pointed out in earlier reports (Godinho and Simões, 2009 and 2010). The set of measures provided in the NSRF 2007-2013 is generally appropriate, insofar it addresses the main challenges identified. The fields in which, at the time of writing (December 12th 2011), the mix has more shortcomings regard the promotion of entrepreneurship and the provision of managerial support to SMEs.

The main bottlenecks to respond the challenges identified do not lay therefore in the set of specific measures, but rather on other issues. As explained more in detail in the table below, the efficiency and effectiveness of the policy mix is seriously undermined by two problems. The first is the insufficient coordination among the different policy perspectives which precludes the development of a systemic approach to tackle the challenges. The design and implementation of research and innovation policies has not been steered at the highest political level, and there are no clear orientations concerning “smart specialisation”. The second is the dominance of a “linear model” perspective. It is assumed that investment in science and the “transfer” of scientific knowledge to companies would be the key to ensure an innovation based competitive approach. Politicians seem to lack a clear view about the systemic nature of the innovation process and do not realise the importance of the non-technological dimensions. Furthermore, the insufficient in-house capabilities and the passive and bureaucratic stance adopted by some organisations in the public sector are not conducive to foster innovation. These issues are further exacerbated by the institutional failures mentioned in the next section.

Policy implementation has been one of the weak links. Though several improvements have been introduced, companies continue to complain that the process is still too bureaucratic. This reduces the take up by the target actors. The transfer of competences to regional authorities in several measures introduced an additional administrative burden with implications in terms of implementation. However, the experience has proved generally positive, since it enabled the development of a better dialogue between applicants and the administration, thereby easing the process. The evaluation of the NSRF carried out (Augusto Mateus and Associados, 2010) suggests that the implementation machinery improved with regard to earlier CSF rounds; it notes, however, the need to improve some aspects, namely a better project follow-up. On the other hand, the financial crisis raised further problems to implementation, since matching funding traditionally provided by banks has been significantly curtailed. To sum up, much can still be done to make implementation easier and more efficient. Two evaluation exercises have been carried out regarding the NSRF 2007-2013 ([Augusto Mateus and Associados, 2010](#); [IESE and Quaternaire Portugal, 2011](#)). They are both of a general nature and do not address specific policy measures in detail. They are also mainly concerned with implementation, and less with effectiveness aspects. An interesting, and positive, finding regards the fact that while tangible investments keep the majority share in the investments supported, there has been increased room for intangible investments (Augusto Mateus and Associados, 2010; Simões and Godinho, 2011). Although both evaluation exercises provide a positive assessment, they agree in stressing the advantage of adopting a more clear strategic perspective towards the policy mix.

A brief summary of the assessment of the effectiveness of the policy mix to address the challenges identified in Section 2 is provided in the table below.

Table 2: Assessment of the policy mix

Challenges	Policy measures/actions	Assessment in terms of appropriateness, efficiency and effectiveness
Improving strategic policy design, coordination and medium-term consistency	Technological Plan. Strategic Programme on Entrepreneurship and Innovation.	The Technological Plan played an important role in responding the challenge identified. Although just having 'soft power', the Technological Plan Office was able, in part due to the proximity to the Prime Minister, to significantly improve policy coordination, involving the different Ministries and organisations relevant for innovation policy. Unfortunately, however, since 2009, the work of the technological plan was to a large extent discontinued, thereby undermining innovation policy coordination and consistency. The new Strategic Programme on Entrepreneurship and Innovation was approved by the Council of Ministers on December 7 th 2011.
Improving the systemic density and the efficiency along the system	Programmes: Strategic Programme on Entrepreneurship and Innovation . Advisory policy bodies: Higher Council for Science, Technology and Innovation (HCSTI) Measures: Competitiveness and Technology Poles (CTP) OTICs (Technology Transfer Offices) Co-promotion projects R&D Consortia. Collective R&D projects. RTD Voucher CITECs and NITECs	The effects of the policy instruments (including programmes, advisory bodies and specific measures) have been mixed, but in general its effectiveness to respond the challenge has been limited. It is too early to assess the effects of the Strategic Programme on Entrepreneurship and Innovation, since it was launched in December 2011 only. The HCSTI has been inactive since 2005. In fact, the Minister for Science and Technology in the two previous governments has not convened any meeting of this Council. This inactivity has negatively affected the interactions between the various actors of the system, and has undermined the possibilities for the industry to play a role in contributing to define S&T policy priorities. The results achieved by the cluster initiatives (CTP and other clusters) are mixed. In spite of a few very positive examples, the effectiveness of the cluster policy in bringing about an increased systemic interaction remains limited. The OTICs have helped universities to become more involved in technology commercialisation. However, the linear approach model implicit in this initiative significantly reduced its effectiveness. The role played by Co-promotion projects and R&D consortia has stimulated cooperative University-Industry projects. In contrast, Co-promotion projects may be considered a failure. They were not able to generate an acceptable take-up. Though making a positive contribution, the measures RTD Vouchers, CITECs and NITECs have obviously a very limited role in influencing the systemic density of the system. In global terms, in spite of the existence of potentially relevant policy instruments, the implementation has been insufficient to effectively respond the identified challenge.
Changing from a broad range research policy to a selective research policy, based on a set of priority scientific fields	Revision of the State Laboratories System. Creation of the Iberian International Nanotechnology Laboratory (INL) S&T Thematic Networks	Science policy has been characterized by the absence of prioritisation of specific fields. The revision of the State Laboratories system as well as the cooperation with US universities ('Partnerships for the Future') has introduced some priority orientations. The effect of these remains, however, very limited. The creation of the INL corresponded to the identification of nanosciences and nanotechnologies as an important research priority, which may be considered as a positive development. However, in general terms, no initiative has been taken so far to develop a process of definition of priority fields in research policy, involving the participation of the various stakeholders. This issue is even more important in the present context of budgetary restrictions. To sum up, no systemic and consistent initiative has been taken to address the challenge identified.

Challenges	Policy measures/actions	Assessment in terms of appropriateness, efficiency and effectiveness
Stimulating the emergence of new companies, both domestic and foreign-owned, particularly in knowledge intensive activities	FINICIA Support to Venture Capital and Business Angels (FINOVA) Many dispersed initiatives (namely at regional level) Strategic Programme on Entrepreneurship and Innovation.	In spite of the dispersion of initiatives to stimulate entrepreneurship, they were not satisfactory in terms of appropriateness, efficiency and effectiveness, as the Strategic programme for Entrepreneurship and innovation implicitly recognised.. They have not led to a clear upsurge in the creation of new firms with potential for succeeding in the international arena. The shallowness of capital markets has also hindered the development of skilled venture capital firms and business angels. The new Strategic Programme on Entrepreneurship and Innovation is intended to address these problems. Another field where policy has been unsuccessful regards the attraction of new knowledge-based companies from abroad. Although there have been a couple of success stories, foreign investment policy has largely disregarded this important target.
Strengthening SMEs in-house technological, organisational and marketing capabilities	NITECs RTD Voucher Innovation Voucher SME Skills Support System (other measures besides the Innovation Voucher) Collective Actions Support System	Traditionally, support provided to SMEs was chiefly of a financial nature and did not address the provision of services. The NITEC measure, introduced in the third CSF, and the Innovation Voucher contributed to balance the kind of support provided. The NITEC initiative was very successful in the first years, but the take up has declined in the recent past. Available information suggests that the Innovation Voucher has generated a reasonable demand, although no specific evaluation has been carried out. Therefore, the policy mix is now more appropriate to respond the challenges. Three important aspects are still insufficiently addressed: the provision of management support to traditional SMEs (in spite of the introduction of some improvements); management support to new high-tech companies; encouragement to SMEs cooperation for innovation and internationalisation.

4 National policy and the European perspective

Portugal together with the whole EU has been living in a very volatile environment. The difficulties which some EU governments, including the Portuguese government have felt in borrowing in the financial markets, turned into a much wider crisis of the Euro system. By the date of writing this report (December 12th 2011) there are no convincing signs that the present difficulties will be easily overcome. The prospect of the EU members (or most of them) agreeing on a new treaty limiting public debt to a certain threshold does not guarantee *per se* a solution for the short-term financial and economic problems.

The urgency of a solution for these problems has made governments focus on macroeconomic stabilisation and attentions have moved away of the more microeconomic and longer-term research and innovation policies. This shift in attention does not mean that these policies have become less important but only that governments have had no time to deal with the structural issues. The overcoming of the crisis may however open very important opportunities for bringing into the national and EU agendas several key structural constraints. This means that a clear policy set together with the strategic willingness of both governments and the main stakeholders of research and innovation may be very helpful in bringing the member states to move forward to a more qualified development trajectory.

In the case of Portugal the intense public discussion that has been happening in the sequence of the assistance programme drawn by the EU, the ECB and the IMF, has led to a better identification of some key barriers to further economic advancement. By now there is a consolidated perception that the present crisis stems from both demand and supply factors. On the demand side an over-evaluated currency has facilitated imports, while the membership of the Eurozone has allowed for excessive low-cost borrowing in the financial markets. On the supply side the widening productivity gap with the EU leaders has set the country in a low productivity, low growth trajectory. The combination of these forces has helped the economic and business structure to freeze in benefit of the intermediary agents located between import and final consumption, instead of stimulating the development of knowledge-intensive firms with high value-added products. The move to a more medium-tech economic structure that happened between the late 1980s and 2000 has to a great extent been consolidated, but the (expected, and to a certain desirable) shrinking of the traditional sectors that has meanwhile occurred has not been compensated. Most of the employment created over the last two decades has been concentrated in non-tradable activities. The very low pace of knowledge-based entrepreneurship has meant that the dualistic nature of scientific and technological development has aggravated.

The existing policy mix has been characterised as being quite comprehensive (Godinho and Simões, 2010). The structural policies set up with the help of the EU over the previous two decades have allowed national research and innovation policies, in combination with other important areas of the policy mix, to be fully equipped and with proper targets. In this sense the policy toolbox in Portugal does not compare poorly with the more advanced economies. The more immediate reason why they have not been that effective lies in the macroeconomic aspects indicated above. But their limited effectiveness lies also in several other relevant, deep-rooted shortcomings. First of all structural policies have barely dealt with the institutional aspects which affect entrepreneurship, risk-taking, collaboration, creativity and innovativeness. The cultural framework and the way formal and informal institutions interact generate an incentive profile which has not been in line with a systemic development of research and innovation. Research continues to be carried out and supported mainly in a linear perspective. The lack of coordination of both sectoral policies and between government and the business sector, which the NSRF 2007-2013 was supposed to overcome, has remained without significant changes. And despite the increasing integration of thematic priorities in research policy, these have not been pursued together with the business sector.

As stated above the policy mix and the diversity of instruments that have been implemented are quite comprehensive. Further their analysis indicates a broad alignment with the ERA objectives. ERA policies have been set out with the strategic objective of creating a more unified space for researchers and knowledge circulation in Europe. There is an intention of rationalizing research efforts while at the same benefiting from economies of scale in new S&T knowledge creation. Therefore all R&D activities, initiatives and policies that involve a transnational perspective in Europe are part of this effort. As the table below highlights, initiatives have been implemented in Portugal across all ERA dimensions, although some important challenges and shortcomings still persist.

Table 3: Assessment of the national policies/measures supporting the strategic ERA objectives (derived from ERA 2020 Vision)

	ERA dimension	Main challenges at national level	Recent policy changes
1	Labour Market for Researchers	<p>The increasing supply of new PhD holders has meant that the research labour market has shown growing difficulties to absorb them</p> <p>The current crisis implies that business firms will not start absorbing highly qualified personnel in the shorter timeframe</p> <p>The brain drain of world level scientists that the country faced in previous decades may now be aggravated</p>	<p>The Ciencia 2008 created 1,000 new research jobs (but all were non-permanent positions)</p> <p>The reviewed statute of the university career has changed the incentives profile and created new recruitment possibilities</p> <p>The salary reduction of the public sector has also affected the academic careers</p> <p>The "Welcome II Portugal" programme was established to attract European researchers with working experience in third countries</p>
2	Cross-border cooperation	<p>National policies need to learn to manage the trade-off between increasing European collaboration and capturing benefits for Portugal, as spatial economies of scale may set in</p>	<p>Portugal has been active in participating in the ERA-NETS, ETPs and JTIs.</p> <p>Joint-programming has started to be deployed</p> <p>Creation of INL, a joint Portuguese and Spanish venture</p>
3	World class research infrastructures	<p>Portugal has no RI roadmap</p> <p>The Iberian Nanotechnology Laboratory, which was set up in 2009, needs to enter a sustainable development trajectory</p> <p>The reform of the national labs network has not reversed the trend for losing some world-level capabilities that previously existed in those labs</p>	<p>Two important research infra-structures were recently launched: the INL and the (private) Champallimaud Research Centre</p> <p>Several supporting research infrastructures were created over the last decade (Biblioteca do Conhecimento Online, Rede de Ciência, Tecnologia e Ensino Superior - RCTS and the Portuguese National GRID Initiative)</p>

	ERA dimension	Main challenges at national level	Recent policy changes
4	Research institutions	<p>Some Portuguese universities, or at least some of their research units and labs, have acquired world-level capabilities, but overall the universities lack the scale and muscle to compete worldwide. Two out of the three public universities in the Lisbon region are however in talks for a possible merger.</p> <p>The capacity afforded by the new law on the governance of Higher Education institutions for the universities to opt for the foundation statute, under which they could enjoy greater financial autonomy, has been upheld</p>	<p>A new law on the governance of Higher Education institutions, RJIES was passed in September 2007</p> <p>The statute of the university career was fully reviewed in 2009</p>
5	Public-private partnerships	<p>The growth in university patenting has not yet turned into significant transfer and development of applied technology</p> <p>There is not yet a grounded culture of mobility between the academic research and the business sector</p>	<p>A professionalized network of TTOs has been established in many HE institutions</p> <p>Creation of the Technology Demand and Supply Marketplace</p> <p>The 'Competitiveness and Technology Poles' and the 'Other Clusters' have been key COMPETE measures</p>
6	Knowledge circulation across Europe	<p>Despite a growing focus on thematic priorities by research policy, this has not meant an increased collaboration and knowledge circulation between academia and the business sector</p>	<p>The measures foreseen under the NSRF 2007-2013 within this scope are under implementation</p> <p>Portugal has been active in participating in the ERA-NETS,ETPs and JTIs</p>
7	International Cooperation	<p>The country will need to learn how to collect the spillovers from an increasing participation in international research efforts, to integrate them into the reinforcement of national research institutions and into strategic projects</p>	<p>Research internationalisation has been a strategic priority for more than one decade</p> <p>Important bi-lateral initiatives have been established (Partnerships for the Future, INL)</p> <p>There was a decision to establish a UNESCO Centre for doctoral education of Portuguese speaking researchers.</p>

In congruence with the analysis on the sections above, namely sections 3.3 and 3.4, some possible direction towards which the current policy mix should evolve in the short and medium term can be identified.

The economic and financial crisis has absorbed the attention of government towards macroeconomic stabilisation, which of course is the greatest challenge in the short term. The negative consequence of this is that even more than before research and innovation policies have not been dealt with at the highest political level. Apart from the need to reform the labour market, no other major structural perspectives have been

present in policy statements in recent months. The need to conceive a strategy regarding how to achieve “smart specialisation” as a post-crisis scenario, bringing in all the major stakeholders around a common platform, is a pre-condition for a successful policy mix.

The interaction between science and innovation needs to be brought to the forefront of the strategy, as the country has developed a pronounced dualism in terms of science (stronger) and technology (weaker) capabilities. The virtues of the linear model approach are virtually exhausted. The move towards starting to define thematic research priorities which happened in recent years has not occurred with the involvement of business interests. Policy instruments which have been implemented ([CTP](#) and [Other Clusters](#) and other joint-platforms) need to integrate much further the cooperation between academia and business firms.

The recent reforms in secondary education curricula are positive but their effects are very much in the long term. As the education and training systems are not providing the right mix of skills, curricula need to be reviewed in congruence with future scenarios. The law on university governance (RJIES) that was passed in 2007 needs to be fully implemented, to allow universities to interact further with the communities they are based on, while at the same time providing the seeds to move ahead in terms of advanced basic and applied knowledge.

Government itself needs to keep the momentum which happened over the previous decade with regard to administrative modernisation, while becoming a more intelligent stakeholder in the innovation game, through public procurement, definition of objectives and standards of practice and steering the cooperation between the main stakeholders of the innovation system. Further the policy mix needs to integrate initiatives driven towards institutional reform in order to promote behavioural change regarding entrepreneurship, creativity and innovation.

Annex: Alignment of national policies with ERA pillars / objectives

1. Ensure an adequate supply of human resources for research and an open, attractive and competitive single European labour market for male and female researchers

1.1 Supply of human resources for research

The conditions in the research labour market in Portugal have been changing fast in recent years. While traditionally those who got a job in both the higher education system and in the public research labs were offered the possibility of pursuing a career with clear stages of advancement and the prospect of long-term employment security, this is no longer always the case. Many institutions have adapted harder tenure granting procedures and the recruitment of new researchers, even for replacement purposes, is much more difficult due to budgetary pressures or legal restrictions. In this context, institutions have been able to absorb some “fresh blood” essentially by contracting younger researchers for non-permanent positions, by using Post-Doc grants which provide support from three up to six years.

These changes have happened along a swift expansion of the research labour market, which was possible through the decades-long policy of investing in the training of new doctorates and, more generally, increasing the supply of new graduates in S&T. In 1982 there were 5,736 researchers (3,963 FTE), equivalent to 0.9‰ of the active population, but by 2008 the equivalent figure was 87,565 (47,882 FTE) or 8.6 ‰ of the active population.

The average annual number of new PhDs awarded by Portuguese Universities rose from below 50 per year in the 1970s, to more than 1,000 by the early 2000s. The most recent figures showed that 1,267 new PhDs were awarded in Portugal in 2009. Further to this growing supply of PhDs, the number of new holders of higher education degrees has steadily increased.

More generally the human resources in S&T (HRST) as a share of the economically active population in the age group 25-64 has increased from 17.3% in 2000 up to 23.9% in 2010. These figures compare with a EU-27 average for both years of 34.1% and 40.5% respectively. This growth in the supply of individuals holding higher education (HE) degrees or equivalent has however been reflected in a rising unemployment rate among educated people.

According to a [GPEAR study that surveyed all PhD holders in Portugal who got their degrees between 1970 and 2008](#), the number of those who hold a research job in Portugal by 2008 was 17,010 out of 19,876 (85.6%). From the remaining, 890 (4.5%) held non-R&D jobs, 653 (3.3%) had retired or had no employment, 654 (3.3%) could not be contacted and 669 (3.4%) were working abroad. From those who hold a research job in Portugal, 13,888 in higher education, 2,231 in the private-non profit sector and 695 in Public Research Organisations), while only 196 were in the business sector.

To compensate for the trend of increasing unemployment among PhD holders, the Ciencia2008 initiative helped in establishing 1,000 new Post-Doc positions in the research units supported by the [FCT](#). These positions are expected to last up to 5 years, over which those benefiting from them enjoy salary conditions equivalent to young PhDs entering the research or university careers.

The information on the research grants awarded by FCT for Doctoral and Post-Doc positions (see [annual FCT reports](#)) indicates that in the decade between 2000 and 2009, 34% of Post-Doc grants were awarded to foreigners, while for doctoral research the situation over most of the decade was that a fraction below 10% of the grants was awarded to foreigners. This situation has however changed swiftly in 2008 and 2009, with foreign participation in PhD grants getting respectively to 13% and 18%. Of the Post-Doc positions offered under the Ciencia2007 and Ciencia2008 initiatives, 42% were awarded to

foreign nationals. The perception is that this expressive weight of foreigners has only incidence in the junior positions of the research system, while the senior positions remain so far almost entirely in the hands of Portuguese nationals. Such recent changes may however have long term impacts in an increasing internationalisation of the domestic research labour market.

1.2 Ensure that researchers across the EU benefit from open recruitment, adequate training, attractive career prospects and working conditions and barriers to cross-border mobility are removed

Research and academic careers have had a certain parallel in Portugal. The salaries for both careers are also similar. In 2010, before the current crisis started to impact, salaries started from a gross monthly salary of €3,192 (for an Assistant Professor in the earlier stage of the career) up to €5,402 (for the most senior position). These figures compare favourably with salaries of holders of university degrees in the Public Service, whose gross salaries ranged from about €1,334-3,002 per month. However, the 2011 and 2012 government budgets have imposed severe cuts on public servants' salaries, including of those who work in the national labs and public universities. Those cuts started at 3.5% for a salary of €1,550 up to 10% for salaries above €4,200. The cuts impacted across all the faculty and researchers working in universities and public research labs and happened in the sequence of a generalized salary freeze put in place in 2010 when salaries were kept at the same level as in the previous year. For 2012, further to the keeping of the salary freeze, only 12 out of the traditional 14 salaries will be paid.

[A study on the remuneration of researchers in the public and private sectors](#) carried out for the Research Directorate-General of the European Commission in 2007 showed that Portuguese researchers were in the medium-low range in terms of remuneration level in the EU25. The Portuguese position in the overall ranking seemed to be negatively affected by the substantial number of fellowships currently awarded in the country. According to the same study, when level of experience is considered, Portugal was among the group of countries with lowest salaries paid in the EU25 to non-experienced researchers (0-4 years). Researchers in this group had a yearly remuneration of €9,644, which was less than half of the EU average.

PhD and Post-Doc grants are typically supported by the [FCT](#). The monthly stipend of a PhD grant awarded is €980 in Portugal and €1,710 abroad, while post-doc grants are, respectively, €1,495 and €2,245. These values have been kept constant since 2002.

Specific grants and funds are available to allow universities and research labs to attract foreign scientists. Also a few private firms are following active policies to attract foreign talented researchers, who may have a previous track-record in business R&D or with appropriate business R&D skills. While this trend is not general, some firms like *Bial*, a pharmaceutical company with headquarters in the periphery of Oporto, are contracting foreign researchers for their R&D labs. However, the absorption of researchers by the private business sector is still very limited in overall terms. This

The updated [statute of the universities' teachers career](#), was designed with an intention to change this situation through a relative flattening of the academic pyramid, by imposing that at least 50% of the tenured staff at universities should be composed of associate and full professors. The prevailing budgetary conditions might however jeopardise such endeavour, at least in the medium-term.

While a national policy for the research labour market has started to emerge in the most recent years, the European Charter of Researchers has not been at the centre of Portuguese policy as regards researchers' work and careers. It is thus unsurprising that, according to the [EURAXESS site](#), only four Portuguese organisations have signed the [European Researchers' Charter](#).

The 2009 [review of the academic career statute](#) has marked a significant shift in traditional academic labour market rules, as it has imposed open international competitions for the positions in the academic career. . As the competitions for positions are essentially based on the evaluation of written CVs, this means that there are not critical barriers to incoming researchers. However, the obligation of the

candidates holding the “Agregação”, which is an examination process that qualifies the candidates to compete for the top positions in the university career, was kept.

In May 2008 the [Invited Chairs programme](#) was launched, aiming at to attracting international high level researchers to stimulate the internationalisation of Portuguese universities.

In terms of the access to grants offered by FCT, the situation is somewhat different. The number of grants available for PhD training has been rising since the early 1970s, at least until recently. As the supply of new researchers holding a PhD degree has grown significantly, there has been, since the middle of the 1990s, the awarding of post-doc grants and other scholarships for senior positions.

The grants awarded by FCT have been intended primarily for Portuguese nationals, though foreigners who have a resident statute may apply. Mobility is explicitly valued, namely in the case of the national researchers with foreign doctoral degrees who wish to return to Portugal. The larger national universities host Mobility Centres intended to assist incoming researchers. These Mobility Centres are members of the European Network of Mobility Centres ERA-MORE.

FCT has addressed grants to foreign researchers wishing to perform their research in Portuguese Universities. As pointed out above, of the 1,000 post-doc positions offered in the sequence of the Ciencia2008 initiative, which were planned to last up to 5 years each, a significant proportion has been taken by foreign nationals. However, the regulation issued in July 2010 imposes that a foreign national may only be entitled to compete for the offered grants if she or he holds a permanent resident visa, which is not possible to be granted before a 5-year period of temporary residence. It should nevertheless be pointed out that the 5-year requisite may be waived if the grant is to participate in an initiative belonging to international agreements or partnerships of which the Portuguese government is signatory.

As the research community has grown significantly, new instruments have been developed for its management. The [DeGóis Curricula Platform](#) is a tool managed by [FCT](#) for gathering, supplying and analysing the intellectual and scientific production of Portuguese researchers who have been invited to upload their CVs in the Platform. This Platform was developed with the objective of identifying the scientific domains in which researchers work. This facilitates the potential international mobility of researchers.

Regarding the use of the European Researchers’ Mobility Portal, it should be noted that [the corresponding Portuguese Internet site](#) has a very intense use. By February 2012 the site boasted more than 1.6 million visits since its inception in June 2006. Overall there are 872 organisations registered in this portal.

1.3 Improve young people's scientific education and increase interest in research careers

The commitment to the development of post-graduate education has been evident throughout the last three decades. The achievement of a large pool of PhDs was envisaged as a pre-condition for the development of the R&D system.

Despite recent advancements, important weaknesses still remain. The share of those pursuing higher education in the fields of science and engineering has been relatively small. There has been an imbalance between supply and demand of scientific and engineering degrees offered by the higher education, in contrast to medicine, law or business. This stems partly from secondary school pupils avoiding the areas containing subjects related to mathematics and physics. The government that took over after the June 2011 election has announced changes of the curricula in secondary education, increasing the absolute time dedicated to the teaching of both Portuguese and Mathematics.

The best higher education institutions have taken up in a balanced way into their curricula aspects such as creativity, critical thinking, problem solving, teamwork, and communication skills. The fact that several universities have been part of international programmes has also helped to diffuse best-practices

regarding these dimensions. However, entrepreneurship training or intellectual property teaching are still absent from the great majority of institutions, including engineering schools.

1.4 Promote equal treatment for women and men in research

Women made up 41% of all HE lecturers and professors in 2001 and 43% in 2007. In the research sector the equivalent proportion was 44% in 2006, which compares very favourably with the EU-27 average of female researchers of 28%. Nonetheless, in the associate laboratories, only 4 out of a total of 25 currently existing have women as directors. Further, the number of women promoted to full professorships in the universities is well below their share in total faculty (see report of [Godinho and Simões, 2009](#)).

Portuguese law guarantees a four month maternity leave for women with full pay. Scholarships follow the same rule, as they are paid over the leave and extended for the same duration. Women cannot be fired during pregnancy and their return to the same type of work is guaranteed by law. The four months leave can now be used by either the child's mother or father.

2. Facilitate cross-border cooperation, enhance merit-based competition and increase European coordination and integration of research funding³

A consistent feature of Portugal's scientific and technological (S&T) policy has been internationalisation. The commitment to internationalisation has been underlined time and again by various governments, and has given rise to several actions aimed at strengthening Portugal's involvement in the successive Framework Programmes (FPs) as well as in the creation of the European Research Area. It has also led to the launching of the Partnerships for the Future, namely with US Universities as well as to the creation of the above mentioned [INL](#), the Iberian International Nanotechnology Laboratory (Godinho and Simões, 2009). The programme of the present Government does not identify internationalisation as a key objective of S&T policy. This is more a matter of form than of content, since there is a specific reference to "encourage the integration of the national scientific system into the European research space" (Programa de Governo, 2011, 119).

Having said this, it is important to recognize that, in spite of a few exceptions, partly due to the fact that during the last two decades Portugal has adopted a broad range S&T policy, actions regarding the support to joint programming and jointly funded initiatives have stemmed more from specific bottom up initiatives by disciplinary scientific communities than from top level orientations.

An interesting example on this regard is Portugal's involvement in ERA-NETs. This area was considered by [GPPQ](#) (the National office for promoting Portuguese participation in the Framework Programme) one of those in which Portuguese participation had been more successful (GPPQ, Newletters May and November 2010). As mentioned at an earlier report (Godinho and Simões, 2011), "criteria for deciding to participate in ERA-NETs are mainly related to research excellence of the Portuguese ERA-NET "champions" as well as to the existence of a critical research mass in Portugal". The decision to participate in ERA-NETs is taken by [FCT](#), the Science and Technology Foundation, on the basis of the advice the disciplinary Scientific Advisory Committee concerned. FCT has recognised the positive effects of the ERA-NET experience in the effectiveness and quality of management of the national research programmes.

³ Promote more critical mass and more strategic, focussed, efficient and effective European research via improved cooperation and coordination between public research funding authorities across Europe, including joint programming, jointly funded activities and common foresight.

- Ensure the development of research systems and programmes across the Union in a more simple and coherent manner.
- Promote increased European-wide competition and access of cross-border projects to national projects funding

Portugal has also been involved in a few initiatives under Article 185 of the Treaty, namely [Eurostars](#), managed by AdI, the [Innovation Agency](#), and [Ambient Assisted Living \(AAL\)](#), whose management was assigned to UMIC, the Agency for the Knowledge Society. Worth mentioning is also the participation in several European Science Foundation (ESF) initiatives, namely in the Research Networking Programmes, which are long term programmes to lay down the foundation for nationally funded research groups to address major scientific and research infrastructure issues, as well as in ESF Research Conferences; EuroBioFund; and [EUROCORES](#). Reference is also due to the participation in European public-private partnerships, namely in the European Technology Platforms (ETPs) and the Joint Technology Initiatives (JTIs). The Government Programme highlights the commitment “to encourage key axes of industrial research through public-private partnerships” at European level (Programa do Governo, 2011: 119). Information disclosed by GPPQ (2010 b) indicates that [Manufuture](#), aimed at promoting the development of manufacturing technologies; [Networked and Electronic Media \(NEM\)](#), focused on the convergence of media, communications, consumer electronics, and IT, and [eMobility](#), on mobile communications, are the ETPs in which the participation of Portuguese organisations has been more positive.

With regard to joint programming (JP), Portugal is mainly involved in two initiatives, dealing with marine research and Alzheimer’s disease. Portugal has expressed concerns about the development of JPs. The former government considered that excessive segmentation should be avoided, since it is not convenient for countries with small research communities such as Portugal.

An interesting trend in the recent past has been the development of bilateral cooperation to carry out joint research initiatives, and not just the traditional support to researchers’ mobility. Some new bi- and multi-lateral agreements include the launching of joint calls, are emerging. Joint initiatives have already been taken with other European countries to promote joint research projects in some specific fields. In the wake of the creation the above-mentioned [INL](#), a joint programme was launched with Spain to promote cooperative research projects in nanosciences and nanotechnologies. In the same vein, a cooperation agreement was entered into by Portugal, Spain and France to launch a call for joint projects in the field of knowledge-based bio-economy (KBBE).

The key principle for eligibility to national research programmes is one of residence, and not of nationality. This means that foreign researchers resident in Portugal (i.e. working in Portuguese Universities or research organisations) are granted equal treatment with their Portuguese colleagues. Therefore, foreign PROs, HEIs and similar organisations are not eligible for funding under national research programmes not connected to ERA-NETs.

3. Develop world-class research infrastructures (including e-infrastructures) and ensure access to them

The programme of the new Government, which took office in mid 2011, makes no reference to research infrastructures. Since there are no further policy documents regarding research or S&T policy, there is no sound evidence about the policy stance towards research infrastructures.

As mentioned in our analytical report 2010 (Godinho and Simões, 2011), the former government had a critical stance *vis-à-vis* the ESFRI roadmapping exercise. Portugal’s involvement has been limited. The argument was that ESFRI mostly corresponded to projects that were not validated by the EU’s Council of Ministers. In addition there was/is a financial argument, since Portugal’s resource constraints prevents the financial engagement in the creation of new European RIs. Portugal has no RI roadmap. In spite of that general attitude, in recent years, FCT has been supporting the national research teams willing to participate in preparatory stages for the establishment of new European RIs. In particular, different types of support have been provided to enable such teams to apply for financing in the scope of the FP.

Portugal has specialized namely in the nano-sciences and nano-technologies field, with the creation of [INL](#), the Iberian International Nano-sciences Laboratory, a joint undertaking with Spain. This is intended

to be a leading research centre in Europe, and is open to the participation of non-Iberian researchers and research groups.

Portugal's RI landscape in terms of quality of large national infrastructures and scientific-technological platforms may be considered as good.

This is the result of an effort undertaken since the late 1980s, with support of the Structural Funds. In 2001, a specific public [Programme for the Renewal of Scientific Equipment \(PNRC\)](#) was launched. It involved a financial envelope of €91.6m and the creation of six National Networks. Since then, there has been no other broad scale programme. Research institutions have applied to existing support programmes to renew and upgrade their scientific equipment.

Three relevant research infrastructures have been created since 2000: [Biblioteca do Conhecimento Online \(On-line Knowledge Library, b-on\)](#), [Rede de Ciência, Tecnologia e Ensino Superior - RCTS](#) (S&T and HE Education Network) and the [Portuguese National GRID Initiative](#). More than 40,000 professors and researchers and 340,000 students from 66 research and higher education institutions now have access to the b-on contents and search engine, which also provides access to the Web of Knowledge bibliographic reference and citation tools. RCTS is a computing network, run by [FCCN](#), which makes use of Internet protocols to provide a collaboration and communication platform among educational, scientific, technological and cultural institutions. The GRID Initiative, launched in 2006, is aimed at encouraging the development of GRID Computing and the sharing of distributed computing resources. Its objectives include the strengthening of inter-disciplinarity and collaboration between researchers and users of high performance computing and pursuing Portuguese integration in the GRID Computing international network. More recently, two important research infra-structures were launched: the [INL](#), mentioned above, created in 2009; and the Champallimaud Research Centre, launched in 2010. This Centre is private, being managed by the Champallimaud Foundation, set up after the donation of Mr. António Champallimaud, a Portuguese billionaire. It is mainly focused on translational medical research on cancer and neurosciences.

4. Strengthen research institutions, including notably universities

Academic autonomy of universities has been a principle adopted by Portugal since the 1974 revolution. This has also involved a certain managerial autonomy, as universities (and polytechnics as well) have had internal mechanisms to appoint their government bodies. In contrast financial autonomy has been much lower as HE institutions have heavily depended on government funding. This situation has however been changing fast in recent years. With the advancement of the Bologna process, universities have been pressed to seek alternative sources of funding, as public funding declines.

An important mark in changing the HE institutions context has been the passing of a new Law on Higher Education, [RJIES](#), in September 2007. Its headlines were presented in earlier reports (see Godinho and Simões, 2008 and 2009). As a result of the new statute Universities selected in 2009 and 2010 the external representatives for their General Councils, which now include distinguished entrepreneurs, managers, professors and other public personalities. New rectors and deans were chosen by open tender.

Under RJIES, public universities were offered the option to become a foundation. Two universities (Aveiro and Porto) and a university school (ISCTE) have chosen to do so. Several other universities that were expected to make a similar move have not done so out of the fear of financial instability and of employment insecurity for their staffs, which would lose the statute of civil servants they have enjoyed.

Most of the funds universities receive from the public budget cover operational costs, namely the staff salaries and other intermediate consumption. These funds have been complemented by other sources, i.e. students' fees and services offered to the communities to which the universities belong. Typically the universities' research funding is not administered by the universities themselves, but by the research

centres and research institutes that were established in connection to them and which in many case enjoy accounting autonomy. The level of support to these research units depends on the quality of the research performed. Their activities are systematically and periodically subject to review and appraisal by scientific peers, including foreign researchers and national researchers working in foreign universities or research institutes.

The funding of the universities has depended primarily on their areas of specialisation and number of students enrolled. Medical schools, for instance, get in relative terms more funding than social sciences faculties. Apart from this, funding depends also significantly on the balance between the number of graduates and the proportion of dropouts. The number of Master and PhD programmes in the university has a similar positive effect on funding, as well as the ratio of academic staff holding PhD degrees.

[Competitive funding for universities' teaching](#) was introduced for the first time in 2009. It is still a small amount of money compared with the overall university budget, since the funds allocated to this mode of financing represent around 2% of the funding of operational costs. The criteria linked to this competitive funding are qualitative and in line with those noted in the paragraph above.

In 2007 the Portuguese government set up the Agency for Assessment and Accreditation of Portuguese Higher Education (A3HE) for quality assurance. A3HE is a private foundation that is responsible for the assessment and accreditation of higher education institutions and their study cycles. So far the activity of this Agency has been concentrated on the pre-accreditation of new programmes and on the preliminary accreditation of study programmes already in operation.

The 2009 review of the statute of the universities' teachers' career has introduced an important novelty, imposing internal assessment mechanisms in each university. The evaluations to be carried out every 3 years will focus on 4 dimensions of universities' staff activities, respectively: teaching; research; extension activities; and participation in the university's administration. The universities have meanwhile set up regulations on how to implement these evaluations. In future, staff performing poorly in two successive evaluation exercises might be removed from the academic career.

5. Facilitate partnerships and productive interactions between research institutions and the private sector

A set of organisations are in place to facilitate the partnerships and productive interactions between research institutions and the private sector. These include namely science and technology parks and incubators, knowledge and technology transfer offices (OTICs), technology transfer centres, technology centres, new technology institutes, engineering and product development centres, and industrial property support offices. In spite of several cases of excellence, such as the Instituto Pedro Nunes, a well-known incubator associated to the University of Coimbra, the efficiency of most of these mechanisms has left much to be desired (Augusto Mateus and associados, 2005). This is in part due to the insufficient managerial capabilities of many organisations. It also stems from demand weaknesses, due to the lack of firms' capabilities, especially SMEs, to establish appropriate links with those organisations. But it is also, to a large extent, the result of the 'linear approach' behind the creation and management of these mechanisms.

Several measures taken in the context of the Competitiveness factors operational Programme (CFOP/[COMPETE](#)) of the National Strategic Reference Framework ([NSRF](#)) 2007/2013 were aimed at promoting such partnerships and interactions, namely the Innovation and the RTD Vouchers, the Innovation Vouchers, the Co-promotion Projects, the [Competitiveness and Technology Poles](#) (CTPs) and [Other Clusters](#).

The Innovation Agency launched a Technology Supply and Demand marketplace. This is aimed at matching knowledge supply and demand. It is supplemented by brokerage events, often in connection with European brokerage initiatives. According to the information disclosed by AdI (AdI, 2009) supply exceeds demand. The results so far remain limited. UTEN, the University Industry Enterprise Network

was created in 2008. It comprises the TTOs of the main Portuguese Universities and research organisations. A closer link was recently established between UTEN and the Universities, with the [Council of Rectors](#) becoming involved in the following up of UTEN's activities.

There are signs that the new Government is committed to strengthen partnerships and interactions between research institutions and the private sector. The [Government programme](#) points out the intention to launch measures aimed at the following:

- promoting the collaboration between companies and universities;
- To create wage incentives for researchers contingent upon their capability to mobilize resources, to develop high quality research, to license-out patents and the impact of their activities in terms of company cooperation;
- To stimulate patenting with a view to licensing-out in international markets;
- To ensure that contracts with universities include specific targets regarding spin-offs, patent registration and licensing-out, and the inclusion of entrepreneurship issues in the curricula; and
- To promote the creation of “new generation incubators”, enabling pre-incubation and incubation of technologies and products with high potential for commercialisation in national and international markets.

A programme, the Strategic Programme for Entrepreneurship and Innovation has been approved on the 7th of December 2011. This new Programme is based on four main pillars: (1) enhancing citizens' competencies; (2) encouraging innovation; (3) stimulating entrepreneurship; and (4) launching more appropriate financing instruments. In implementing this Programme it might be important to avoid the 'linear model' trap, for the initiatives to provide a significant impulse to innovation.

With regard to IPRs, the remarks made in the previous report (Godinho and Simões, 2010) are still valid:

“Despite Portugal having not developed a specific legal framework, such as a Bayh-Dole Act inspired legislation, universities have set up their internal regulations, in general defining that the property of the invention shall be granted to the institution, but reserving certain rights for the inventors, namely in terms of income sharing, in line with the provisions of the research career statute mentioned above. The situation now is that a relatively competent supporting structure exists (GAPI and OTIC offices, also UTEN), and a few universities have significant patent portfolios, but the situation is still very limited in terms of actual exploitation. In sum, the granting of patents to Portuguese universities may yet be seen at this stage, as more related to reputation aspects, than as related to an effective capacity of actually transferring knowledge to the business sector and transforming that into actual earnings”.

Except for University-based research, the level of government-owned research is limited (see 3.2 above). According to 2009 data, the Government sector was responsible for 7% of the overall R&D expenditures only. Therefore, the relevance of government-owned research is extremely limited. This suggests that the initiative of reorganisation of the State Laboratories systems, launched in 2006, did not lead to a revival of this sector, on the contrary, it has been continuously declining, and losing relevance. The results of University and State Laboratories research are usually published in international journals, and therefore are freely available. With regard to results more directly relevant to companies, different diffusion strategies have been followed, including the use of demonstration projects, the provision of services incorporating research results, and the free diffusion of results, when they may be easily understood and applied by the economic agents concerned.

Researchers' mobility in Portugal is very limited. The administrative framework has not been supportive of such mobility, either from public to private sector or vice-versa. As mentioned by Godinho and Simões (2010), the 2009 revision of the University Teachers' Career Statutes provided that university teachers might be freed from their university duties for specified periods to carry out extension services or

research projects. However, this change has not gone so far as anticipated. In fact, the creation of effective conditions for cooperation very much depends on the evaluation criteria defined by each University. In our view, the expectation that the reformed statute would provide a strong impulse towards university-industry cooperation did not materialize, since incentives for conventional academic performance are still dominant. On the other hand, the possibility of bringing in individuals with significant experience from the private sector has increased, with the creation of the General Councils and Councils of Curators (see below).

Regarding the salaries to be paid, both the academic career in universities and in public research labs, a distinction is made between staff with or without “exclusivity”. This means that those who opt to dedicate all their professional effort to their institutions benefit from “exclusivity” pay, while those who involve in consultancy and other external paid activities will lose one-third of their salaries. This feature has acted as a barrier for researchers to become involved with industry. The situation is likely to change, as the universities tend to manage the consultancy and other outside activities of their staff paying that extra work together with their salaries (and thus not discounting the “exclusivity” premium), while retaining a proportion of the external earnings as “overheads”.

As mentioned above, earlier rounds of Community Support frameworks provided for the creation of TTOs (called OTICs - Knowledge and Technology Transfer Offices) in the main Universities and Polytechnics, and TLOs (called [GAPIs](#) - Industrial Property Support Offices). With the NSRF 2007-2013, the broad support provided to these organisations was discontinued. This kind of organisation may however apply for public support addressed to specific projects. Even so both types of structure have been able to survive and keep working. In some cases OTICs and GAPIs merged, in order to exploit synergies and economies of scale.

The new law regarding the legal statute of universities and polytechnics was published in April 2009 (RJIES). It brought about some significant changes in the governance of higher education institutions. Universities and their schools have to appoint General Councils, whose membership should include relevant individuals from outside the university ranks. As a result of this, respected personalities, including people from the private business sector, have been invited to take part in the body which has now strategic control of the institutions. As pointed out by Godinho and Simões (2010), 3 out of the 15 existing public universities have decided to become foundations. The new foundations have to appoint a Council of Curators, composed of “five personalities of high merit and whose professional experience is recognised as very relevant” for the institution; the curators are nominated by the government under proposal of the university. This move represents a convergence with the Anglo-Saxon model where the chancellor is a personality typically without any previous connection whatsoever with the university.

6. Enhance knowledge circulation across Europe and beyond

Policy headlines concerning knowledge circulation did not undergo significant changes since the last report (Godinho and Simões, 2009). There is a political commitment to strengthen the relationships between Universities, research organisations and companies. This is expressed in different measures under the [COMPETE programme](#) pointed out in 2.2.2 above. The [Innovation Agency \(AdI\)](#) launched a [Technology Supply and Demand Marketplace](#). Effort towards increasing Portuguese involvement in the 7th Framework Programme (FP7) has been pursued by [GPPQ](#), the office in charge of promoting Portuguese participation in FP7.

The main change on this regard was the publication of the [reviewed university teaching career statute](#) in 2009. The former version of the statute was envisaged by many observers as one of the key hindrances to University-Industry collaboration. The preamble of reviewed statute indicates “the creation of conditions for the cooperation between universities and other organisations” as an important reason for the reform undertaken. In the new framework university teachers may be freed from their university duties, for specified periods, to carry out extension services or research projects outside their university. However, the change did not go so far on this regard as anticipated. The creation of effective conditions

for cooperation will very much depend on the evaluation criteria currently being defined by each University. The expectation that the reformed statute would provide a strong impulse towards university-industry cooperation may not materialize, as incentives for conventional academic performance remain dominant.

Important initiatives, taken in earlier rounds of SFs to stimulate transfer activities from the universities, concerned, as indicated above, the creation in the main Universities and Polytechnics of TTOs (OTICs), and TLOs ([GAPIs](#)). Nowadays the support provided to these organisations was discontinued. While some were able to forge their own way ahead, others were not able to survive. In some cases OTICs and GAPIs merged, giving rise to what was called GAPI 2.0.

UTEN, the University Industry Enterprise Network, created in 2008, includes the TTOs of the main Portuguese Universities and research organisations. A closer link was recently established between UTEN and the Universities, with the [Council of Rectors](#) becoming involved in the following up of UTEN's activities.

The [COMPETE](#) programme, which is part of the NSRF 2007-2013, includes several of measures aimed at fostering knowledge circulation, which were mentioned above. Further, the measures on the creation of R&D teams and R&D centres in companies, though not specifically addressed to promote knowledge circulation, are also relevant since they contribute to improve firms' low absorptive capacity, one of the main barriers to University-Industry cooperation.

The main conclusions of the recent mid-term evaluation of the 2007-2013 NSRF (IESE/Quatenaire Portugal, 2010) on this regard suggest the existence of a trend towards an increased commitment of companies to invest in R&D, with 74 projects aimed at the creation of R&D teams. This is in line with the overall R&D statistics and may be interpreted as indicating that the creation of in-house anchors enables the development of R&D cooperation initiatives. The number of [RTD vouchers](#) is somewhat below expectations, having in mind the simplification of the incentive assignment process. Interestingly, as the evaluation report points out, there is a very strong geographical concentration, as more than 90% of the projects involving organisations are located in the Norte and Centro regions. The report suggests that this may be a consequence of the insufficient capacity of the S&T organisations, namely University R&D units, in other regions to provide services to firms.

The creation of [CTPs](#) and [Other Clusters](#) was the most innovative and wide ranging measure under the NSRF's [COMPETE](#) programme. In particular, CTPs are expected to provide a shared context enabling cooperation between R&D organisations, companies and other players in order to develop, share and apply knowledge to enhance the country's competitiveness. After a long process of building up the clusters, with some of them following a bottom up approach while in others there was a strong push from the top, they underwent a selection procedure. The evaluation led to the selection of eleven CTPs: [Health Cluster Portugal](#); [Fashion Competitiveness](#); [PortugalFoods – Agrifood Competitiveness and Technology Pole](#); [EnergyIn](#); [Competitiveness and Technology Center for the Forest Industries](#); [Engineering & Tooling from Portugal](#); [Petrochemicals, Chemicals and Oil Refining Competitiveness and Technology Pole](#); [Mobility Industries Competitiveness and Technology Pole – Portugal Mobi 2015](#); [PRODUTECH – Sustainable Manufacturing Technologies Pole](#) (linked to the European MANUFUTURE technology platform initiative); [Pole for Information and Communication Technologies](#); [Turismo 2015](#) (Tourism 2015).

Since two years only have elapsed since the creation of the CTPs it is probably too early for a sound assessment of their activities. Anecdotal information suggests that so far a significant variance exists in their performance.

As mentioned above, AdI, the [Innovation Agency](#), continues to manage the brokerage initiative [Technology Supply and Demand Marketplace](#). This is aimed at matching knowledge supply and demand. It is supplemented by brokerage events, often in connection with European brokerage initiatives. According to the information disclosed by AdI (AdI, 2009) supply exceeds demand by large. The results so far appear to be limited.

A reference is due to the organisation of events aimed at promoting the interaction between research organisations and companies, while using the results from cooperative endeavours for demonstration purposes. An example of this effort is the '[Portugal Tecnológico](#)' (Technological Portugal) exhibition held in September 2010.

7. Strengthen international cooperation in science and technology and the role and attractiveness of European research in the world

Internationalisation is a strategic priority of Portugal's research policy. This includes a significant engagement in EU initiatives, namely the FP, but also cooperation with non-ERA countries, namely the USA. Though the public funding mechanisms do not make transnational cooperation compulsory, the quality and depth of such cooperation are well regarded. Transnational research cooperation, both in terms of its track record and future prospects, is taken into consideration in the evaluation of research proposals and research organisations. The top research organisations in the country are highly internationalized and their networks are spread around the globe. This has been strengthened by the recruitment of foreign researchers, whose share in the wave of recruitment for 1,000 new research jobs that occurred in the second half of the 2000s was above 40 %.

One of the key features of the internationalisation of the Portuguese research system of S&T policy was the establishment of the so-called "Partnerships for the Future" (which encompass cooperation with several US universities), and in the involvement in a number of initiatives in the context of FP7. Agreements were entered into with the following US Universities: MIT, Carnegie-Mellon, University of Texas at Austin and Harvard Medical School. The initiative also included an agreement with Fraunhofer Gesellschaft.

Another central vector has been the creation, in cooperation with Spain, of [INL](#), the Iberian International Nanotechnology Laboratory. INL has an international legal framework similar to intergovernmental laboratories in other areas located in Europe such as CERN, ESO, EMBL, and ESRF. The laboratory was established by Portugal and Spain, but the idea is that it might later be opened to the membership of other countries both European and non-European.

The joint-initiatives in the context of ERA-strengthening policies to a large extent mostly overlap with the Lund Declaration strategic areas of research: natural and environmental risks (which include global warming); pandemics and public health; and social transformations (including ageing societies). Area-specific initiatives in the context of the "Partnerships for the Future of Portugal" and thematic research consortia deal with energy or security.

The development of bi-lateral or multi-lateral research cooperation to carry out joint research initiatives has therefore been emerging as a new trend. As a matter of fact, a new generation of bi- or multi-lateral agreements, including the launching of joint calls, is emerging. An example is the cooperation agreement between Portugal, Spain and France to launch a call for joint projects in the field of knowledge-based bio-economy (KBBE). This goes beyond the traditional policies regarding internationalisation, which included support to researchers' mobility and bi-lateral agreements with limited funding and targets.

References

- Augusto Mateus & Associados (2005): [Actualização da Avaliação Intercalar do PRIME – Relatório Final](#), Lisboa.
- Caraça, João M. G. (1999): 'A prática de políticas de ciência e tecnologia em Portugal', in M. M. Godinho and J. M. G. Caraça (orgs.), O Futuro Tecnológico: Perspectivas para a Inovação em Portugal, Oeiras: Celta.
- Caraça, João M. G. and Vitor Corado Simões (2008): Estudo de indicadores de impacto do Plano Tecnológico, Lisboa, GCNELPT.
- Crato, Nuno (2006): [O "Eduquês" em Discurso Directo: Uma crítica da pedagogia romântica e construtivista](#), Lisboa, Gradiva.
- COTEC Portugal, Barómetro de Inovação, http://www.cotecportugal.pt/index.php?option=com_content&task=view&id=1835&Itemid=362).
- European Commission (2011a): Innovation Union Competitiveness Report, Brussels: European Commission.
- European Commission (2011b): Innovation Union Scoreboard 2010, Brussels: European Commission.
- GCNELPT (2008): Estratégia de Lisboa. Plano nacional de Reformas – Portugal. Novo ciclo. Consolidar as reformas, Lisbon, GCNELPT (usually referred as NRP 2008-2013)
- Godinho M. M. and Simões, V. C. (2005): R&D, Innovation and Entrepreneurship 2007-2013, Report for the Observatório do QCA, Lisboa: ISEG.
- Godinho, M. & V. C. Simões (2009): ERAWATCH Country Report 2009, An assessment of research system and policies: Portugal. Luxembourg: Office for Official Publications of the European Communities, <http://cordis.europa.eu/erawatch/index.cfm?fuseaction=home.downloadFile&fileID=1072>
- Godinho, M. M. and Simões, V. C. (2011): ERAWATCH Country Report Portugal 2010, Brussels: European Commission, http://erawatch.jrc.ec.europa.eu/erawatch/export/sites/default/galleries/generic_files/X04-CR2010-PT-v2.pdf
- Godinho, M: M., Pereira, T. S., Simões, V. C. and G. Rebelo. (2010): Estudo sobre a procura de patentes com origem em Portugal, Lisboa, INPI
- GPEARI (2011): Fluxos e situação profissional dos doutorados em Portugal - 2009. Lisboa: GPEARI.
- Laranja, M. (2007): Uma nova política de inovação em Portugal? A justificação, o modelo e os instrumentos, Coimbra: Almedina.
- POFC (2007): Programa Operacional Temático Factores de Competitividade, Lisboa.
- Plano Tecnológico (2005): Plano Tecnológico: Uma estratégia baseada no conhecimento, na tecnologia e na inovação, Lisboa, November.
- PRO INNO (2009a): European Innovation Scoreboard 2008 – Comparative analysis of innovation performance, PRO INNO Europe paper nº 10, Brussels: European Commission.
- Programa do XIX Governo Constitucional (2011): Lisboa: Presidência do Conselho de Ministros, http://www.portugal.gov.pt/media/130538/programa_gc19.pdf
- Simões, V. C. (1997): Inovação e Gestão em PME, Lisboa: Ministério da Economia.
- Simões, V. C. (2007): INNO-Policy TrendChart – Policy Trends and Appraisal Report Portugal 2007, European Commission: Brussels.
- Simões, V. C. (2008): INNO-Policy TrendChart – Policy Trends and Appraisal Report Portugal 2008, European Commission: Brussels.
- Simões, V. C. (2009): Inno-policy TrendChart, Innovation policy progress Report Portugal 2009, Brussels: European Commission.

Simões, V. C. (2011): Mini-country Report/ Portugal (to be published).

Vicente, Luiz M. (2006): Tecnologia e Educação formação nas Empresas portuguesas: 35 casos de referência, Lisboa: Companhia das Letras.

List of Abbreviations

A3HE	Agency for Assessment and Accreditation of Portuguese Higher Education
AdI	Innovation Agency
BERD	Business Expenditures for Research and Development
CERN	European Organisation for Nuclear Research
CNEI	National Council on Entrepreneurship and Innovation
CTP	Competitiveness and Technology Poles
ECB	European Central Bank
EPO	European Patent Office
ERA	European Research Area
ERA-NET	European Research Area Network
ESA	European Space Agency
ESFRI	European Strategy Forum on Research Infrastructures
EU	European Union
EU-27	European Union including 27 Member States
FCCN	Foundation for National Scientific Computing
FCT	Science and technology Foundation
FDI	Foreign Direct Investment
FP	European Framework Programme for Research and Technology Development
FP7	7th Framework Programme
GBAORD	Government Budget Appropriations or Outlays on R&D
GDP	Gross Domestic Product
GERD	Gross Domestic Expenditure on R&D
GOVERD	Government Intramural Expenditure on R&D
GPEARI	Planning, Statistics and International Relations Office of the Ministry for Education and Science
GPPQ	Office for promoting national participation in the Framework Programme
HEI	Higher education institutions
HERD	Higher Education Expenditure on R&D
HES	Higher education sector
IMF	International Monetary Fund
INL	Iberian International Nanotechnology Laboratory
IP	Intellectual Property
IPTS	Institute for Prospective Technological Studies
JRC	Commission's Joint Research Centre
KBBE	knowledge-based bio-economy
KIBS	Knowledge-Intensive Business Services
MCTES	Ministry for Science, Technology and Higher Education (ceased to exist in June 2011)

MEC	Ministry for Education and Science
MEE	Ministry for the Economy and Employment
MEID	Ministry for the Economy, Innovation and Development (ceased to exist in June 2011)
NEM	Networked and Electronic Media
NRP	National Reform Plan
NSRF	National Strategic Reference Framework
OECD	Organisation for Economic Co-operation and Development
OTICs	knowledge and technology transfer offices

Programme for the Renewal of Scientific Equipment

PNRC	
R&D	Research and development
RCTS	Science, Technology and Society Network
RI	Research Infrastructures
RTDI	Research Technological Development and Innovation
S&T	Science and technology
SF	Structural Funds
SME	Small and Medium Sized Enterprise
TTOs	Technology Transfer Offices
USPTO	United States Patent and Trademark Office
UTEN	University Technology Enterprise Network
VC	Venture Capital

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Abstract

The main objective of the ERAWATCH Annual Country Reports is to characterise and assess the performance of national research systems and related policies in a structured manner that is comparable across countries. EW Country Reports 2011 identify the structural challenges faced by national innovation systems. They further analyse and assess the ability of the policy mix in place to consistently and efficiently tackle these challenges. The annex of the reports gives an overview of the latest national policy efforts towards the enhancement of European Research Area and further assess their efficiency to achieve the targets.

These reports were originally produced in November - December 2011, focusing on policy developments over the previous twelve months. The reports were produced by the ERAWATCH Network under contract to JRC-IPTS. The analytical framework and the structure of the reports have been developed by the Institute for Prospective Technological Studies of the Joint Research Centre (JRC-IPTS) and Directorate General for Research and Innovation with contributions from ERAWATCH Network Asbl.

As the Commission's in-house science service, the Joint Research Centre's mission is to provide EU policies with independent, evidence-based scientific and technical support throughout the whole policy cycle.

Working in close cooperation with policy Directorates-General, the JRC addresses key societal challenges while stimulating innovation through developing new standards, methods and tools, and sharing and transferring its know-how to the Member States and international community.

Key policy areas include: environment and climate change; energy and transport; agriculture and food security; health and consumer protection; information society and digital agenda; safety and security including nuclear; all supported through a cross-cutting and multi-disciplinary approach.



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